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ABSTRACT

This paper advances the thesis that high level thinking in classrooms happens when students become conscious of experience and knowledge realities and decide to pursue them flexibly and creatively. The specific research focuses on the author's conviction that effective stimulators of student reflection will accommodate knowledge encounters that promote metacognitive consciousness, idea consequences, idea engagements, and idea openness. Also featured is a call for and description of a teacher evaluation or "self-inspection" format that encourages questions and resolutions by teachers pertaining to their effectiveness as student reflection facilitators. The paper addresses at length knowledge forces that may liberate and enhance high quality thinking in school classrooms. An education self-appraisal instrument is appended. (JD)

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DYNAMIC KNOWLEDGE FOR STUDENTS IN CLASSROOMS -- IT'S SELF-INSPECTION TIME FOR EDUCATORS

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I'm a professional educator - a scholar who values precision and objectivity. But I also read novels and write book reviews as a professional book critic for a major newspaper. That work takes me into more passionate and metaphorical thought. Editors and readers want to know if I like a certain book and they want the opinion in creative and comprehensible prose.

Recently, I reviewed a novel about an adolescent boy who comes of age when he blunders into a World War II Nazi U-boat gravid with spys. His resourceful coping with powerful and dangerous forces elevates his character and maturity. I praised the book and concluded that while it doesn't quite soar with the skylarks, "...it flies well and without faking out or showing off in front of anyone." 1

My editor was delighted. He phoned and complimented me on "...a nicely crafted and creative closure." He liked my thinking! Yet I'm disturbed... Why? Could it be a fear that I may not generate another just-right review closure for a long time? No... I can live with that possibility. But my discomfort (I think) comes from another kind of recognition - that the systematic and analytic part of me is grabbing territory that my creative persona thought it owned. Have I become drafted into the android ranks of taxonomizers? Instead of discovering and creating knowledge, am I now more satisfied with the packaging of approved knowledge for efficient delivery to the consummers in elementary, secondary, and college classrooms?

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Years ago as a callow teacher of high school English, I didn't consider good thinking in classrooms to be a byproduct of academic analysis, reassembly, and recycling into better (good) thinking. Good thinking was more like a "blooming miracle" and my artistic feelings about it were very democratic. All of us could think if the knowledge and surrounding circumstances were efficacious. I also believed that good thinking was an activity cherished by most persons, including teachers and students. Good thinking was often an individual endeavor and dependent on individual needs and challenges. Any notion that good thinking should be academically disassembled, then coded, and finally rebuilt into a <u>better product</u> would have been as comfortable for me as hard time in rural sanitariums. Yes, I was still an educator artist.

Doctoral rigors altered my pastoral perceptions and I shifted toward an increased state of being detail conscious and more concept appreciative. I began to think more about low inference measures and pay increasing attention to the new educator syntax of various hierarchies, thought-level taxonomies, and to language like "interaction analysis" and the " psychomotoric domain." I perceived certain merits(and still do) in the resurgence of educator scientists. But effective teaching, learning, thinking and anything else related to excellent education cannot live by epistemology and scientific analysis alone.

That other self - that poet - that gone-to-pot creative thinker has begun being shaken awake by the new cadres of "critical thinking" code requirements marching from departments of public instruction and teacher education <u>labs</u>. I am being kneed out of comfortable career sheets by "good thinking programs" that stalk the territories. A wounded part of me has begun to struggle like a "struck leviathon" 2 while the <u>experts</u> peer down from the decks of education as a science.

I still believe that naming what we perceive, analyzing it, and putting it into systems and programs has its modest place in the education of persons. But I will not believe that discrete and carefully arranged analysis of thinking behavior represents much more than a scintilla of the real and wholistic phenomena that we call careful and creative thinking action. A personal resolution from the artist part of me urges that I stop the reflexive genuflection to the Cartesian facsimile, I quantify therefore I am.

How tenaciously the cult of authority and expertise shapes us. As a young teacher, I was criticized for not worshiping in the new educational cathedral, Bloom's Taxonomy. I was

soberly advised to more objectively identify goals in accordance with the approved scheme. I wasn't being systematic enough to suit my bosses. I struggled with rejection while others accepted warm compliments and even recognitions for excellence. I finally learned the right noises and movements in my early years as a college assistant professor when I dutifully presented various taxonomies to students and dutifully demanded a somewhat literal alligience to them.

In recent years, I have partly dismounted from the the education stallion named, USE IT BECAUSE THE RESEARCH SAYS... Now I can suggest various designs for individual student and teacher consideration. But implicit is my conviction that systems can be ignored, or when applied, done so creatively instead of literally. How sad I felt when, at a recent colloquim for college and school system educators, one of the central office personnel said of a teacher (for not correctly using the approved design), "I'm going to write her up! It's gone on long enough. She won't use our task-analysis protocol." Some of us felt embarrased for that speaker, then we realized that many of the participants seemed oblivious to our perception of that complaint and evidently had no compassion for the anonymous "about-to-be-written-up" victim.

I do not write or speak the language of manifestos, but I can warmly identify with the argument that highly organized and "...focused approaches to instruction ... can be regarded only as the systematic deprivation of experience."(Smith, 1989) 3

> "The idea is that ability develops out of the systematic acquisition of bits of information and skills(learn first and then do later), rather than that knowledge and ability accrue as a consequence of engagement in meaningful activities(do now and learn incidently).
>
> However, there is absolutely no evidence that the specification of objectives or the tautly constructed teacher manuals and curriculum guides facilitate learning despite more than 30 years of concentrated research." 4

To be organized is a very good educational condition and so is being organized flexibly and personally. The best system to stimulate good thinking in schools and classrooms is more personally constructed instead of lifted from published thinking programs, designed by experts and resembling market-place apparel ready to be pulled onto or fitted into a curriculum. Haven't "good thinking" movements through the ages flourished more when left alone by managers, experts, and authority figures?

I prefer another concept structure for purposes applied to improved thinking in school classrooms. It is based on a conviction that good thinking seeks a certain kind of good company not designed by experts and advanced in published and marketed programs, but understood, encouraged, and appreciated by sensitive, organized and creative teachers. I propose that:

1) Good thinking keeps company with people and places that are sharing and open.

2) Good thinking keeps company with global and reflective planners.

3) Good thinking keeps company with discovered knowledge.

4) Good thinking keeps company with consequential knowledge

5) Good thinking keeps company with dynamic(and meaningful) knowledge engagements.

SHARED AND OPEN THINKING

Schenkat and Tyser(1986) reported research indicating that the most experienced educators, who are high up on career ladders, are often least inclined to view their professional knowledge as open for discussion. 5 They share the professional jepardy of wanting efficient knowledge delivery and having little interest in knowledge exploration. McNeil(1988) conducted research with high school social studies teachers in a sunbelt state and described them as "...routinely reducing issues to lists of facts, names, places, events, laws, and the like." 6 These teachers would demand the copying by students of dictated material into notebooks, then move on to the "next materials" without dialogue.

McNeil concluded that these teachers knew their content and could discuss it knowledgeably in interviews, but that they wanted to avoid "inefficiencies" related to student questions and open class discussions. McNeil's most significant observation may be her mention of the irony that expert teachers with their firmly established knowledge and finished concept structures are not influential beyond the classrooms. 7 Their classroom concepts are not dynamic, but static, in that students form their important opinions and convictions from peers and less educated adults in the neighborhood and part-time job ethos where information and ideas are discussed, accurate or inaccurate as those dialogues may be. 8

Arranging for shared and open thought in classrooms demands teacher resolution. Consider the journal of a concerned biology teacher who began to examine how he questioned and listened to students (Costa, 1985).

> "I was also curious about the effects of silence and nonjudgemental acceptance. I immediately discovered how difficult it is to structure questions and watch for reactions at the same time.
>
> Given this limitation, I consciously practiced my questions and response behaviors during a two week period and began to notice a number of things evolving in the class." 9

The teacher observed that more students were interested in each others' ideas. More questions were directed to the teacher and to other students. The self-evaluating teacher also suggested (in his journal) the possibility that more students were willing to "...risk responses..." because of the lower anxiety levels due to perceptions that their responses would not be classified "...as only right or wrong." 10

The teacher above was reflecting on tactics for soliciting better and more immediate oral responses from students. But open knowledge climates may demand even more. Consider the recommendation that meaningful discourse should be attentively designed in advance into the entire conceptual and temporal flow of the unit or course. Good thinking (and the sharing of it in good discourse) should be embedded into ongoing activities like student productions, performances, panel reports, and portfolios. Such student generated (though teacher encouraged and aided) endeavors could be designed as options to more conventional requirements like formal papers, quizzes, tests, and the like. 11

In a shared and open knowledge classroom model teachers are dialogic rather than idea controlling. Such teachers:

1) listen as much as speak,
2) plan for and encourage discussion,
3) represent issues as problematic,
4) represent solutions as flexible,
5) sensitize learners to values,
6) teach and act with emotion,
7. use books and materials that interest and inspire.

Teachers interested in self-reflection pertaining to the state of shared and open thinking in their classrooms might consult APPENDIX(Figure) I for possible guidance.

GLOBAL AND REFLECTIVE PLANNERS

I am usually reflective in my problem solving, but I wasn't born this way. In adolescence ... and beyond ... I could be frequently impulsive in the way I reacted to and perceived tasks. I know that my doctoral thesis would be better today than it turned out thirteen years ago because my cognitive style is now more global and reflective.

Less mature planners move into problems without a vision of the major parts or problem context. These local planners tend to wait too long before doing preliminary reflection which allows a needed process of unseen organization and evaluation to occur. Then they suddenly (impulsively) get to work, feel rushed, develop negative emotion, and rush toward task completion.

By contrast, the global planner tries to gain a kind of higher ground for preliminary whole-problem survey. Global planners do not act or react immediately toward quick problem solutions, but plan and puzzle out the parts and try to chunk many of those discrete parts into fewer and more wholistic task challenges. Global and reflective planners will not immediately begin to write papers, but plan their progress toward the writing labors. They will make sure they understand the terms of the assignment, plan the timelines, play around with topic titles, do preliminary note-taking, and assume the probability or two or even three necessary paper drafts.

Sometimes I still want to rush into a task. It is an anxious reaction. The task grins at me. There it capers, daring me to start and finish it. The impulsive local planning imp in me wants to dart into it, quickly wrap it up ... and toss it! But the task continues to taunt, "Come on, jerk! Get rid of me if you can! Put on the gloves! I'll go five rounds with you ... and when we're finished, I'll be back in this mean little corner ... and you'll be in a hospital somewhere!"

Good thinking in classrooms keeps company with teachers who recognize the importance of the global and reflective planning process. Such teachers encourage its further development in more advanced students and strive to help it begin among the more impulsive students.

Increasing attention has been devoted to metacognition in journals and at conferences. Awareness of one's cognitive style may be the surest ground for beginning to sow the motivation and skills that promote global and reflective planning. Teachers at every level of education need to begin fostering student introspectiveness pertaining to awareness of their motives, plans, recognitions, evaluations, and general knowledge encounters. Metacognitive alertness exists for thinkers when they begin the reflection process on questions like:

1) What kind of a thinker am I?
2) When am I a successful thinker?
3) What kind of events stimulate my thoughtful self?
4) What are some important events in my life as a thinker?

Teachers interested in further pursuit of theory and practice related to students and metacognitive energies might consult APPENDIX(Figure) II for further guidance.

DISCOVERED KNOWLEDGE

We want to TELL students their education. AND WE CAN TELL students their thinking and learning. We can give students the facts and provide the content structures. We can develop various testing formats appropriate to early childhood, elementary, secondary, and college education consumers. But will such teacher-centered efforts and precision produce thinking from students? Students can learn responses and demonstrate learning on tests without ever thinking about their responses or the supposedly mastered concepts. When will enough of we educators begin to move beyond the duplication in classrooms of finished and provided knowledge? Real thinking and idea sharing begins when students begin to find their own voices and produce their own language (Newmann, 1988). 12

I am asking the reader to think about told knowledge vs. discovered knowledge. Combs(1981) writes:

> "We are experts at giving people information. We have been doing it for years. It is the thing we know how to do best. Helping students discover the personal meaning of information is a very difficult matter and the source of most of our failures. The dropout, for example, is not a dropout because we didn't tell him or her. We did that over and over." 13

Many of our best learners may be wickedly smart in solving available, dictated, and well arranged problems. But how well do they take on the less structured problems? 14 How well do they take on the necessary but unassigned problems? How well do they take on problems with moral content? How well do they think beyond the facts?

Reflect on what might be done with knowledge beyond certain factual barriers... Recently, I observed a student teacher ask a group of 4th graders how long ago dinosaurs lived. An eager pupil responded, "From one hundred and thirty-five million to about forty million years ago." The teacher praised the child for the right answer and I was quietly impressed with that pupil's sense of correct number sequence when referring to the progression of BC eras. Then the teacher continued the recitation session.

In a later meeting, I asked if the student teacher recalled that particular question and the pupil's response. She did..."sort of..." Ninety-five million years(give or take a few million) is an immense species reign, I said. The student teacher thought that I was about to refer to a cognitive taxonomy and she began to explain her question as meant to produce "...knowledge rehersal..." I cut in - gently, I hope - and said that the taxonomy and "knowledge rehersal" hadn't occurred to me, but what had occurred was how long ninty-five million years was. What an immense and astounding species reign those great creatures accomplished! Neither teacher or pupils had explored that important (and affective) realization.

Consider the topic of wild Rhinos... Are wild rhinos worth the concern of children? Do children and adults ever think of real rhinos beyond the shallow awareness of their presence in zoos and television programs? How often have children thought about wild rhinos as an endangered species?

I was present when one teacher asked fifth graders what it would mean if the wild rhinos vanished. One child (undoubtably very quick and smart) answered that there are rhinos in zoos "...and even in places down in Florida." The teacher said, "But those aren't wild rhinos." A chorus of students responded, "But they are rhinos anyway!" The teacher continued to pursue the distinction between real wild rhinos and less authentic and transplanted relatives. She wanted the pupils to think beyond appearances and assumptions. This master teacher knew that fifth graders need to probe into the meaning of anything becoming an "endangered species." Is it okay if wild rhinos become extinct as long as we have transplanted ones in zoos or "...down in Florida..."? Such qustions don't have textbook answers. In fact they are usually not in textbooks.

Consider the recommendation that teachers devote more time to plans, materials, devices, and techniques that involve thinkers in "stubbornly persistent problems"(Sternberg, 1985). 14 Such problems involve dilemmas, often affective and moral, that confront or stretch beyond academic confinements. Such problems can't be answered away by textbook phrase or teacher authority. Maybe too many of us don't know how to stimulate knowledge discovery among students... Maybe our only experience as learners has been with knowledge wrapped and received as facts... So how can we portray it any other way? How sad.

CONSEQUENTIAL KNOWLEDGE

To say that the importance of knowledge is at least partly relative seems responsible and safe. How frustrating it is for teachers to lament, "They just don't understand how important this content is!" But is it important ... to them? Do the various classroom activities (and tests) "...have links to the real world..."? 15 Do students perceive the required thinking and learning in schools as being connected with "...adaptive success in the real world..."? 16 The work of Wagner and Sternberg (1984) describes traits and skills of very successful persons or "career stars." They are described as knowing how to manage themselves, knowing how to manage others, and knowing how to manage their careers. 17 The ability - that quality of intelligence - that seems to show up in the thinking repertoirs of successful persons is "tacit knowledge" or having the right instincts(intuitions) for identifying and solving consequential problems. 18 Do classroom teachers search for opportunities to encourage consequential thinking among their students?

Consequential knowledge is those facts, concepts, and principles that are not going to quickly arrive and then vanish. Consequential knowledge is useful within and beyond the classroom. Such knowledge also has good affective surface. It arouses interest in task initiation and high quality completion. As a teacher who believes in the value of interfacing students with consequential knowledge, I should be trying to connect students with work that goes beyond quantitative grading suitability, that is perceived by students as efficacious (useful) in and beyond the classroom, that arouses individual and group emotion, and that has a certain motivation force, independent from teacher authority, that impels task initiation and high quality completion.

Even the sometimes maligned requirement to memorize something can represent consequential knowledge if that requirement satisfies more than obligatory performance on a paper-and-pencil short-answer test. Having to memorize assigned facts could be perceived

as a very consequential requirement if students know that those facts will be needed recurrently for the duration of a unit or course. Knowing that the memorized facts will be needed for a very important event within the course or unit would make that memorization very consequential.

Consider research demonstrating that rote memorization, with an understood purpose, can become a very consequential assignment (Perfetto, 1983).19 One group of students was told that the rote memory of several sentences would soon aid them in solving various riddles. After memorization mastery, these informed students were presented with the riddles, which they solved with high frequency. SEE APPENDIX (Figure) III. In contrast, other students, instructed to memorize isolated sentences, but without a perceived purpose, did not solve the riddles though they had demonstrated isolated rote memorization mastery of the isolated sentences that should have provided solution cues. Consequential knowledge is processed into larger motive and achievement systems. Memorized but inconsequential knowledge is neither processed comprehensively or gainfully transferred into a meaningful achievement.

For example ... Ponder what might be a typical kind of school assignment. The student is instructed to memorize ten historical incidents from the presidential life of John F. Kennedy. The importance of such an assignment is dubious to students if mastery requires a formal written test performance. But what if the teacher tells students that on a specified day, any five of them will be summoned to the front of the room to extemporaneously role-play White House reporters reminiscing about the Kennedy Presidency; and that they will have to credibly maintain that role-play skit for ten minutes? With such an understanding of purpose, that memorized knowledge, enriched by additional concept layers that should be absorbed, becomes intensely consequential for role-play participants and student observers. Such knowledge assigned for mastery would create original cognitive, affective, and even physical responses, given the probability that the role-players will use somewhat theatrical gestures and facial expressions.

School knowledge has been described as ranging from "dynamic" to "inert." (Slavin, 1988).20 When students perceive knowledge requirements as consequential, they are more likely to rise above the extrinsic motivations of test performance and graduation honors. When students perceive school knowledge as consequential, they will perceive that knowledge as having dynamic outcomes. If that occurs, the knowledge and the student memory of its dynamic classroom context may become a life-long outcome. Perhaps APPENDIX (Figure) IV will encourage further reflection and self-evaluation about consequential knowledge encounters for students.

DYNAMIC STUDENT ENGAGEMENT

William James, in a lecture to common school teachers in the 1890s, exhorted:

> "You must simply work your pupil into such a state of interest in what you are trying to teach that every other object of attention is banished from his mind; then reveal it to him so impressively that he will remember the occasion to his dying day; and finally fill him with devouring curiosity to know what the next steps in connection with the subject are." 21

Students do not come into my courses afire with "...devouring curiosity..." I need to engage them, which means gain their attention, interest, and resolutions quickly, and then maintain those positive forces for an extended period of time. Part of my exhaustion toward the end of a semester is the awareness that my motivation soldiers are threatening to retreat in disarray from the field of classroom honor. The need to engage student thinking attention and production effort with content knowledge requires asking ourselves some necessary questions before we plan and produce unit designs. A few of those questions might be:

1) Will our goals create positive student emotion?

2) Can possible negative emotion forces be avoided?

3) Can models, charts, simulations, experiments, performances, and demonstrations be embedded in the instruction? Perhaps the more direct question is, can we encourage student knowledge pursuit beyond textbooks and verbal presentations?

4) Can I set up conditions for knowledge pursuits beyond the classroom? Can arrangements be made for encounters with the real worlds of hospitals, museums, galleries, harbors, lake shores, and health departments?

5) Can outside resource persons be brought in for a class or two? The knowledge of "guests" may be more concretely current. Their presence in a class may also shake up the routine for students of having to listen to the "same old cast" of in-school actors.

6) How will I convince students that I value various kinds of knowledge engagements? Do my testing and assignment procedures support such values? Knowledge from textbooks and teacher lectures is usually finished (or teacher-prompted) knowledge. Can open (and student-initiated) knowledge encounters be embedded into syllabi and unit plans?

7) How will I encourage students to think and work cooperatively? How many of us can be indicted for little or no contributions to group cohesion?

> "All the faculty members at my own institution, for example have demonstrated their ability to solve significant problems in their chosen fields. Yet I have often been appalled at what happens when these very individuals get together in a group such as a faculty or committee meeting. The same individuals who have demonstrated beyond a doubt their skill in solving problems individually seem to be at an utter loss when they approach a problem in a group." (Sternberg, 1985) 22

My belief in cooperative thinking opportunities as crucial school and college classroom realities has been a gradual process. In earlier years, it was an elegant abstraction paid lip-service to, yet seemed like so much inefficient effort. Now I believe in the power of cooperative knowledge encounters for all classroom members. That growing belief has changed my teaching identity. Assignments completed individualistically are less emphasized and group performances, productions, and expositions are more valued.

Pertinent questions related to dynamic student engagement from APPENDIX (Figure) V are:

Do I encourage students to visually portray ideas?

Do I try to get students emotionally involved in knowledge?

Do I try to bring in "guest" teachers with specific knowledge and talent to engage students?

Do I communicate to students that I value their efforts to acquire knowledge in various ways and places?

Do I encourage students to apply ideas learned in classes to real world current events?

CONCLUDING COMMENTS

I began these pages wondering if my scholarly self could find peace with my metaphorical muses. I expressed concern that thinking in classrooms was becoming the exclusive domain of epistemologists and efficiency experts, suggesting (by contrast) that thinking in classrooms (or anywhere) was a more mysterious

and uniquely internal process. As an alternative to the cult of thinking efficiency and marketed thinking programs, I proposed that good thinking came with good knowledge encounters in schools and classrooms. I have also proposed that good thinking should be approached in deductive and wholistic ways.

We need to ask ourselves how thinkers can learn openness and dialogue skills. How will we motivate and teach students to plan in global and reflective ways? How will we set up classroom conditions that will prompt and accommodate knowledge discovery? How will we communicate our teaching and knowledge purposes to students so that they perceive their thinking energies as more consequential? How will we recruit student attention to our goals and continue to powerfully engage their efforts toward successful productions?

One can describe beliefs and tactics without intending to insistently promote them. I've tried to present some wholistic and intuitive ideas that might merit educator reflection. They have already been described by others, but the educator-artist part of me admires their historical presence and durability for scholar and artist alike. As professional educator... novice thinker... and reader of novels, I have made some valued gains on those theory and action pathways. I suggest they could use a few more tracks.

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Written responses, invitations for publication or conference presentations are always appreciated.

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APPENDICES (Figures) I, II, IV, V

DIMENSIONS OF STUDENT-THINKING

(Educator Self-Appraisal)

The items in this self-appraisal format are intended to stimulate educator interest and reflection about students as good thinkers in school classrooms. Implicit in each item is the belief that educators can be flexible sources of positive influence pertaining to the item concepts.

The belief that good student thinking can be powerfully prompted and motivated by creative and conscious teacher influences and decisions should also be pondered.

The main focus areas of this form are:

1) SHARED AND OPEN KNOWLEDGE

2) METACOGNITIVE KNOWLEDGE

3) CONSEQUENTIAL KNOWLEDGE

4) STUDENT ENGAGEMENT

The rating concepts and equivalent number values are:

1 (seldom) 2 (sometimes) 3 (often) 4 (very often)

APPENDIX (Figure) I

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

SHARED AND OPEN KNOWLEDGE:

1. I encourage students to be open to various beliefs and values.

1 2 3 4

2. I encourage various student interpretations of knowledge.

1 2 3 4

3. I appreciate sincere opinions, even controversial ones.

1 2 3 4

4. I believe students should know that expert opinions can be questioned.

1 2 3 4

5. Students should know that my opinions can be changed in response to new evidence.

1 2 3 4

6. I compliment students who express new or interesting ideas.

1 2 3 4

7. I believe that all of my students should become good thinkers.

1 2 3 4

8. Students know that I value sincere discourse.

1 2 3 4

9. In my classes, students share their ideas.

1 2 3 4

10. I share doubts and quandries about knowledge with students.

1 2 3 4

APPENDIX (Figure) I

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

SHARED AND OPEN KNOWLEDGE(cont.):

11. In my classes, students feel safe about sharing their ideas.

1 2 3 4

12. During discussions, I make reflective comments about what students say.

1 2 3 4

13. I encourage students to search for various viewpoints.

1 2 3 4

14. I encourage students to perceive ideas and issues in as as many ways as they can.

1 2 3 4

15. I encourage students to practice skepticism about attractive and comfortable knowledge and events.

1 2 3 4

APPENDIX (Figure) II

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

METACOGNITIVE KNOWLEDGE:

1. I help students become aware of their thoughts.

1 2 3 4

2. I encourage students to describe their thinking energies.

1 2 3 4

3. I encourage students to remember various thinking actions.

1 2 3 4

4. I encourage students to identify what they need for good thinking.

1 2 3 4

5. I encourage students to consider when they do their best thinking.

1 2 3 4

6. I encourage students to consciously plan work in advance.

1 2 3 4

7. I encourage students to question how they know things.

1 2 3 4

8. I encourage students to make judgements about what is good knowledge.

1 2 3 4

9. I encourage students to ask how others develop knowledge.

1 2 3 4

APPENDIX (Figure) II

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

METACOGNITIVE KNOWLEDGE(cont.):

10. I try and find out how students develop knowledge.

1 2 3 4

11. I encourage students to question how I develop knowledge.

1 2 3 4

12. I encourage students to analyze and explain their best work.

1 2 3 4

13. I encourage students to describe what kind of thinking they most prefer.

1 2 3 4

APPENDIX (Figure) III

A study by Perfetto and Bransford(1983) portrays the value of memorized knowledge when it is addressed in a consequential context. The series of experiments involved matched students in two separate groups solving the same riddles. Examples of two riddles are:

1) Uriah Fuller, the famous Israeli superpsychic, can tell you the score of any game before the game starts.

2) A man living in a small town in the United States married twenty different women in the same town. All are still living and he has never divorced any of them. Yet he has broken no law. Can you explain?

But before being given the riddles to solve, all of the students(from both groups) were given the same list of sentences and told to memorize them. Only one of the groups was told that the memorized sentences would be clues for solving the riddles. Examples of two sentences for memorization are:

1) Before it starts, the score of any game is 0 to 0.

2) a minister marries several people each week.

The study results were that the students who memorized sentences knowing they would help in riddle solutions, solved the riddles with significantly higher frequency than the uninformed group. In fact the uninformed group, who didn't know that the memorized sentences would be consequential clues to riddle solution, performed no better than a third group of students who were never even shown the sentences.

Even rote memorization which is frequently disparaged as educationally vulgar, can have consequential outcomes if students perceive those outcomes.

APPENDIX (Figure) IV

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

CONSEQUENTIAL KNOWLEDGE:

1. Students perceive work that I assign as meaningful.

1 2 3 4

2. Students perceive work that I assign as interesting.

1 2 3 4

3. Students can be creative with work that I assign.

1 2 3 4

4. I carefully evaluate student work.

1 2 3 4

5. I communicate with students about the quality of their work.

1 2 3 4

6. When students work well at what I require, they are helped by those efforts to do other things well.

1 2 3 4

7. Activities in my classes connect with student lives outside of the classroom.

1 2 3 4

8. When students master knowledge in my classes, they know that they will need that knowledge within the classroom.

1 2 3 4

9. When students master knowledge in my classes, they know that they will need that knowledge for activities beyond the classroom.

1 2 3 4

APPENDIX (Figure) IV

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

CONSEQUENTIAL KNOWLEDGE(cont.):

10. I try to discover the best abilities and talents of students.

1 2 3 4

11. I look for ways to help students use knowledge that they acquire in my classes.

1 2 3 4

12. I encourage students to search for the knowledge they most need.

1 2 3 4

13. I encourage students to study the success of high achievers.

1 2 3 4

14. I encourage students to make firm resolutions about improving their own achievement.

1 2 3 4

APPENDIX (Figure) V

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

STUDENT ENGAGEMENT:

1. I encourage student projects, reports, panels, skits, and other kinds of knowledge pursuits.

1 2 3 4

2. I encourage students to visually portray ideas.

1 2 3 4

3. I try to get students emotionally involved with ideas and issues.

1 2 3 4

4. Students in my classes collect evidence pertinent to assigned problems.

1 2 3 4

5. My students seek knowledge from sources beyond the classroom.

1 2 3 4

6. Interesting persons("guests") with specific knowledge and talent are invited to instruct my students.

1 2 3 4

7. Students know I value their efforts to search for and acquire knowledge.

1 2 3 4

8. I encourage students to construct models that represent their ideas.

1 2 3 4

APPENDIX (Figure) V

1 (seldom) 2 (sometimes)
3 (often) 4 (very often)

STUDENT ENGAGEMENT(cont.):

9. I encourage students to construct devices for purposes of testing and presenting knowledge.

10. I encourage students to consider how they might apply ideas learned in classes to the world of employment and careers.

11. I encourage students to think and work cooperatively.

12. I create classroom conditions that will encourage and enable students to think and work cooperatively.